REMARKS

Claims 1, 3-11, 13-21, 23-41, and 43-60 remain pending in this application. Additionally, new independent claim 61 has been added to the present application.

In the Advisory Action dated December 3, 2003, the Examiner indicated that the amendments would not be entered. In light of the amendments provided in this Preliminary Amendment, Applicants respectfully assert that the claims of the present invention are not disclosed or made obvious by the cited prior art and therefore, are allowable.

The Examiner rejected claims 1, 5, 6, 9-11, 15, 16, 19-21, 25, 26, 29-32, 35, 36, 39-41, 45, 46, 49-52, 55, 56, 59, and 60 under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 4,166, 783 (***Turner***). In light of the arguments and amendments presented herein, Applicants respectfully traverse this rejection.

In the Final Office Action dated October 28, 2003, the Examiner stated that ***Turner*** does not actually use the deposition rate sensors, but still discloses them. Also, the Examiner cites the sputtering source in ***Turner***, which the Examiner asserts may be used to provide rate information to illustrate a prior art sensor. However, Applicants respectfully assert that even though ***Turner*** may mention deposition rate monitors that are used to control the excitation source of the plasma discharge and/or the sputtering source, these disclosures are not enough to anticipate or suggest all of the elements of claim 1 of the present invention. For example, as explained in more detail below, ***Turner*** does not disclose modeling the dependence of the deposition rate on plasma power. As another example, ***Turner*** does not disclose modeling any parameters based upon

target lives, as called for by claim 1 (as amended) of the present invention. Although ***Turner*** refers to a deposition monitor, ***Turner*** does not disclose using the deposition monitor to perform any type of modeling. In fact, ***Turner*** discourages the use of the deposition monitor in contrast to the use of deposition sensor data to perform a modeling, as called for by the amended claims of the present invention. Therefore, all of the elements of claim 1 (as amended) are not taught, disclosed, or suggested by ***Turner***.

Turner discloses a sputtering system, in which the desired deposition rate information is inputted by an operator to calculate the required power (see col. 3, lines 30-34). ***Turner*** discloses that deposition rate sensors are not used to complete a feedback loop, but use the sputtering source itself. ***Turner*** discloses using the sputtering to allow for regulation and correction of a process (col. 3, lines 64-67). However, ***Turner*** does not disclose monitoring the consumption of a sputter target to determine a deposition rate, as called for by claim 1 (as amended) of the present invention. ***Turner*** discloses using the power and duration of the sputtering source operation and calculating a percentage of normalized deposition rate.

Furthermore, claim 1 (as amended) of the present invention calls for modeling the dependence of the deposition rate on plasma power or the deposition time based upon the target life of the sputter target. This is in contrast with ***Turner*** since it does not disclose modeling the deposition rate at all. The Examiner cites the chart in Figure 1 and implies that it refers to modeling of plasma power. Applicants respectfully disagree with this implication. Figure 1 merely plots a relationship between a percentage of normalized deposition rate and kilowatt-hours of operation of the cathode (see Figure 1 and col. 2, lines 35-44). This is provided to illustrate the deterioration of the deposition rate. However, this is not equivalent to modeling the

dependence of the deposition on plasma power or the deposition time based upon the target life of the sputter target, since ***Turner*** merely demonstrates the deterioration of the deposition rate after a certain amount of kilowatt-hours.

Additionally, the Examiner equates aging of the cathode in use to "target lives," however, the "target lives" refer to the lives of the sputter targets (see col. 2, lines 10-13). Therefore, ***Turner*** does not call for modeling any parameters based upon target lives. Additionally, the Examiner states that the graph in Figure 1 plotting the percentage of normalized deposition rate versus the cathode operation (kilowatt-hours) can be used to imply a modeling of deposition rate to plasma power. However, the Examiner offers neither arguments nor evidence to support such a conclusion, nor is there any evidence in ***Turner*** to support such an assertion. Therefore, ***Turner*** does not disclose the element of modeling the dependence of the deposition on plasma power or the deposition time based upon the target life of the sputter target, or using the model to modify a deposition process, as called for by claim 1 (as amended) of the present invention.

Turner discloses using the desired rate specified by the operator, and using an equation in a loop to correct the power for the usage of a cathode used in the sputtering system (see col. 3, lines 32-38, and the equation on col. 3, line 27). ***Turner*** discloses that the duration of the cathode usage is then incremented, updating the kilowatt hours of use (see col. 3, lines 38-42). ***Turner*** corrects the current control of the cathode power supply and continues the loop for controlling the processing of a semiconductor wafer (see col. 3, lines 46-49). In contrast to ***Turner***, claim 1 calls for modeling the dependence of the deposition rate on the plasma power or deposition time based upon the target life, and using the model to modify the deposition processing to approach a desired thickness. Therefore, claim 1 (as amended) is not taught,

disclosed, or suggest by ***Turner***. Hence, claim 1 is allowable. Additionally, independent claims 11, 21, 31, 41, and 51, (all as amended), which have similar elements that call for modeling the dependence of the deposition rate on the plasma power or deposition time based upon the target life, and using the model to modify the deposition processing to approach a desired thickness, are also allowable for at least the reasons cited above. Therefore, in light of at least the above-presented arguments, claims 11, 21, 31, 41, and 51 are also allowable.

Independent claims 1, 11, 21, 31, 41, and 51 are allowable for at least the reasons cited above. Additionally, dependent claims 5, 6, 9-10, 13-20, 23-30, 32-40, 43-50, and 52-60, which depend from independent claims 1, 11, 21, 31, 41, and 51, respectively, are also allowable for at least the reasons cited above. Additionally, for at least the reasons cited above, newly added claim 61 is also allowable.

The Examiner rejected claims 3, 4, 7, 8, 13, 14, 17, 18, 23, 24, 27, 28, 33, 34, 37, 38, 43, 44, 47, 48, 53, 54, 57, and 58 under 35 U.S.C. § 103(a) as being unpatentable over ***Turner*** in view of U.S. Patent No. 6,217,720 (***Sullivan***).

The Examiner stated that the elements relating to the dependence of the deposition rate on the deposition time or inverting the deposition rate model to determine the deposition time is not disclosed by ***Turner,*** and uses ***Sullivan*** to provide such elements. However, as described above, ***Turner*** does not disclose methods and/or apparatus for modeling the dependence of the deposition rate on the plasma power or deposition time based upon the target life, and using the model to modify the deposition processing to approach a desired thickness, which are called for by claims 3, 4, 7, 8, 13, 14, 17, 18, 23, 24, 27, 28, 33, 34, 37, 38, 43, 44, 47, 48, 53, 54, 57, 58 by

virtue of their respective dependencies. Therefore, adding the disclosure from ***Sullivan*** would not make-up the deficit of ***Turner***.

Sullivan discloses a multi-layer sputtering method in which a controller calculates a sputtering time required for the deposition of a specified layer thickness (see col. 7, lines 54-57). ***Sullivan*** discloses a theoretical model that models deposited layer. However, ***Sullivan*** does not disclose modeling the dependence of deposition rate to deposition time. ***Sullivan*** adjusts the layer thickness in the theoretical model (see col. 7, lines 65-67). The Examiner states that the fact that determining a deposition time requires a certain deposition rate equates to modeling a dependence of deposition rate on the deposition time. Applicants respectfully disagree. No evidence or arguments that would support such a conclusion is provided. ***Sullivan*** is directed towards calculating sputtering time for deposition of specified layer thickness, deposition rates are not calculated in this context. Additionally, ***Sullivan*** does not disclose inverting the deposition rate model to determine the deposition time to reach a deposition rate. Therefore, for at least the reasons cited above, adding the disclosure of ***Sullivan*** to the disclosure of ***Turner***, would not provide all of the elements of claims 3, 4, 7, 8, 13, 14, 17, 18, 23, 24, 27, 28, 33, 34, 37, 38, 43, 44, 47, 48, 53, 54, 57, 58. Therefore, in light of at least the above presented arguments, claims 3, 4, 7, 8, 13, 14, 17, 18, 23, 24, 27, 28, 33, 34, 37, 38, 43, 44, 47, 48, 53, 54, 57, 58 are allowable.

The Examiner rejected claims 9, 10, 19, 20, 29, 30, 39, 40, 49, 50, 59, and 60, under 35 U.S.C. § 103(a) as being unpatentable over ***Turner*** as applied to claims 1, 2, 11, 12, 21, 22, 31, 32, 41, 42, 51, and 52 above and further in view of Official Notice.

In light of the description provided above, it is clear that ***Turner*** does not disclose methods and/or apparatus for modeling the dependence of the deposition rate on the plasma power or deposition time based upon the target life using deposition sensor rate data, and using the model to modify the deposition processing to approach a desired thickness, which are called for by claims 9, 10, 19, 20, 29, 30, 39, 40, 49, 50, 59, and 60. The Examiner uses Official Notice to provide the element of modeling deposition rate and power using curve-fitting techniques. However, Applicants respectfully assert that the Examiner does not provide any evidence to support such an assertion. Furthermore, even if, *arguendo*, the element of modeling deposition rate and power using curve-fitting techniques were added to the disclosure of ***Turner***, the deficit of ***Turner*** would not be compensated for since ***Turner*** does not disclose modeling the dependence of the deposition rate on the plasma power or deposition time based upon the target life using the deposition sensor rate data, and using the model to modify the deposition processing to approach a desired thickness, which are called for by claims 9, 10, 19, 20, 29, 30, 39, 40, 49, 50, 59, and 60. Therefore, claims modeling the dependence of the deposition rate on the plasma power or the deposition time based upon the target life using deposition sensor rate data, and using the model to modify the deposition processing to approach a desired thickness, which are called for by claims 9, 10, 19, 20, 29, 30, 39, 40, 49, 50, 59, and 60 are allowable for at least the reasons cited above.

In light of the arguments presented above, Applicants respectfully assert that claims 1, 3-11, 13-21, 23-41, and 43-60 are allowable. In light of the arguments presented above, a Notice of Allowance is respectfully solicited.

If for any reason the Examiner finds the application other than in condition for allowance, the Examiner is requested to call the undersigned attorney at the Houston, Texas telephone number (713) 934-4069 to discuss the steps necessary for placing the application in condition for allowance.

Respectfully submitted,

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